LESSON PLAN

PART I
COVER SHEET

LESSON TITLE: M17 Decontaminating Apparatus

TRAINING METHOD: Demonstration - Performance

REFERENCES: TO 11D1-3-9-1, Operator's Manual For Decontaminating Apparatus: Power Driven, Lightweight, M17 (2 July 90, Chg 1)
TO 11D1-3-9-2, Unit and Intermediate Direct Support Maintenance Manual For Decontaminating Apparatus: Power Driven, Lightweight, M17 (2 Jul 90, Chg 1)

AIDS AND HANDOUTS: Attachment 1, Illustration of M17 Decontaminating Apparatus and major components
M17 Decontaminating Apparatus

LESSON OBJECTIVE: Given an explanation and demonstration of the M17 Decontaminating Apparatus, the student must successfully complete the task steps and three of the samples of behavior and listed below.

TASK STEPS:

1. Inspect the M17 for serviceability.

2. Assemble and prepare the M17 for use.

3. Operate the M17 under usual or unusual conditions as described in the technical order (TO).

4. Shut down the M17.

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SAMPLES OF BEHAVIOR:

1. List the uses of the M17.

2. List the major components of the M17.

3. List the types of fuel required for the heater and engine.

4. List the safety gear used when operating the M17.

ORGANIZATIONAL PATTERN: Sequential

STRATEGY: The technical orders (TO) used for the M17 are also Army Technical Manuals and the format is quite different. Be prepared to explain the differences between Army and Air Force terminology. TO 11D1-3-9-1 does not specify the difference between usual and unusual operating conditions. For our purposes usual operating conditions range from 32 to 89 degrees Fahrenheit. However, local procedures and interpretation take precedence. Army forms, etc. are not required to properly operate the M17. Ensure everyone wears hearing protection when working around the M17. Stress team work and allow students maximum hands on by rotating students through the different tasks as outline in the TO.

LESSON OUTLINE:

Main Point 1. Technical Manuals differ from Technical Orders

a. Know the Safety Precautions

b. Think Safety and Dress for the Mission

Main Point 2. Uses for the M17

Main Point 3. Major Components and Systems of the M17

a. Engine and Engine Fuel Systems

b. Electronic Control Module

c. Heater System

d. Air System

e. Water System

f. Heater Fuel System

Main Point 4. Pre-operationally Check the M17

Main Point 5. Operating Procedures for the M17

a. Operation During Usual Conditions

b. Operation During Unusual Conditions

(1) Ten Degrees or Lower

(2) Operating in extreme Heat

Main Point 6. Shut down procedures

PART II
TEACHING PLAN
INTRODUCTION

ATTENTION:	Imagine your base has survived an attack but many of your assets are contaminated. Or perhaps a peacetime accident has covered your equipment with fuel or other chemicals. How are you going to decontaminate these vital resources and accomplish your mission?
MOTIVATION:	The M17 Decontaminating Apparatus will help you quickly decontaminate the materiels and facilities you need to complete your mission.
OVERVIEW:	This lesson will cover the differences between the M17 TO and other TOs and some safety information on the M17. We will also discuss Pre-operation considerations, M17 components and functional systems. We will also cover the operation and shut down procedures for the M17.
TRANSITION:	We'll begin this lesson by covering some of the differences between this and other technical orders you may have used.

BODY

MAIN POINT 1.
TECHNICAL MANUALS DIFFER FROM TOs

The technical order (TO) for the M17 is a written order. You must follow the entire TO completely. This TO was originally written as an Army technical manual or TM and may use some terms and actions that are not familiar to you. For example all operator pre-operational, operating and post-operating preventive maintenance checks and services are routinely called PMCS. Review the TO and ensure you are familiar with any new terms or steps.

KNOW THE SAFETY PRECAUTIONS

To prevent injury to people and damage to equipment make sure you are familiar with all the cautions, warnings and hazards associated with the M17. For example, never spraying people with the spray wands and the requirement to remove jewelry are two of the warnings. Everyone engaged directly or indirectly in M17 operations must be thoroughly aware of the safety precautions and be capable of recognizing hazardous activities. Always have a fire extinguisher available when operating the M17.

THINK SAFETY AND DRESS FOR THE MISSION	Thinking and working safely must be a firmly established habit when working with or near items capable of creating a hazard. Remember to wear: gloves in cold weather and when using the spray wands, hearing protection within 35 feet and chemical biological defense equipment, as applicable, when operating the M17.
TRANSITION:	To better understand how the M17 operates lets look at the uses and functional areas.
MAIN POINT 2. USES FOR THE M17	Contamination control teams use the M17 to decontaminate materiel exposed to nuclear, biological or chemical agents. Use the shower attachment to provide hot water showers for people. You can decon materiel using water with the shower or spray wand attachments or water mixed with decontaminant using the M17's injector system.
TRANSITION:	The M17 is made up of several major components and functional systems. Lets talk about the components and systems and what they do.

MAIN POINT 3. MAJOR COMPONENTS AND SYSTEMS OF THE M17

The M17 is made up of seven major components:

a. The Engine Fuel Can stores 5 US gallons of engine fuel.

b. The Heater Fuel Can stores 5 US gallons of heater fuel.

c. The Pump/Heater heats and pumps water to operate the attachments.

d. The Tool Kit contains the hand tools needed to do maintenance on the M17.

e. The Accessory Kit is a box that contains all the attachments for the M17.

f. The Water Tank (1,580 US gallons) provides water storage for the M17. Use the water tank when a natural water source is not readily available. (If you are using the 3000 gallon tank refer to TM 5-5430-225-12&P).

g. Lastly, the cover protects the M17 from wind, rain, dust and debris when not in use.

TRANSITION:	The functional systems help give you an idea of how the M17 works. Lets talk about them next.
ENGINE AND ENGINE FUEL SYSTEMS	The M17 two cycle engine drives a centrifugal clutch. This clutch drives the combustion air fan, water pump and heater fuel pump. A five gallon fuel can supplies fuel using an in-line ball pump to prime, or prepare, the fuel system. The engine uses a gasoline and oil mixture; 5 gallons of gasoline mixed with 1 quart of two cycle oil.
ELECTRONIC CONTROL MODULE	The electronic control module of the electronic control system monitors and controls burner ignition and output. It also monitors water pressure, flow rates and water temperature.
HEATER SYSTEM	The heat exchanger consists of the burner and heating coil. The burner's fuel jet gets and atomizes fuel from the heater fuel system. The atomized fuel is mixed with air and ignited. This heated air heats the coils that contain the water.
AIR SYSTEM	The air fan helps draw air from around the engine to cool the engine

and supply preheated air to the heat exchanger. In the heat exchanger the air is mixed with fuel and the electronic ignition system ignites the mixture. The air is forced around the coils to heat the water.

WATER SYSTEM

The water pump is belt driven and supplies variable water flow rates for the M17. Two flow switches sense water flow and send signals to the electronic control system. When the M17 uses large amounts of water it uses both burner jets. This happens when you use the showers, injector or both spray wands. Usually the M17 uses only one burner jet.

HEATER FUEL SYSTEM

The heater fuel system gets fuel from the heater fuel can. The heater's primary fuel is unleaded or leaded regular gasoline but may also use diesel, jet fuel (JP4), or kerosene. After passing through a strainer, filter and magnetic valves the fuel passes to the fuel jets. The fuel goes to the primary fuel jet until there is a need for higher water temperature. As necessary, fuel is routed through the secondary fuel jet to increase burner output. The heater fuel system returns excess fuel back to the fuel can.

MAIN POINT 4.
PRE-OPERATION ALLY CHECK THE M17

Using the TO, complete the designated checks in the order listed. Ensure you have the tools you will need to complete the PMCS. These tools will include items from the tool and accessory kits to service the burner igniter plug and remove the drive side access panel as needed.

INSTRUCTOR'S NOTE: DO NOT USE THIS TRAINING DOCUMENT TO OPERATE THE M17. OPERATING PROCEDURES DIFFER IF YOU ARE USING THE M17 IN USUAL OR UNUSUAL CONDITIONS. FOR OUR PURPOSES USUAL OPERATING CONDITIONS RANGE FROM 32 TO 89 DEGREES FAHRENHEIT. UNUSUAL CONDITIONS ARE BELOW AND ABOVE USUAL CONDITIONS. HOWEVER, USE LOCAL INTERPRETATION TO DETERMINE EXTREME HEAT TEMPERATURES AND HIGH ALTITUDES.

MAIN POINT 5. OPERATING PROCEDURES FOR THE M17

Using the TO, start the M17 after performing all necessary safety steps, PMCS and hose connections. After ensuring the function selector is set to OFF, turn the burner fuel valve control fully clockwise. Set engine throttle to 1/3 of the maximum setting and fully raise the choke lever.

INSTRUCTOR'S NOTE: IF THIS IS THE FIRST OPERATION OF THE DAY OR BELOW SIXTY DEGREES FAHRENHEIT CHECK THE TO FOR EXTRA STEPS NEEDED TO START THE M17.

Pull the starter handle until the engine starts, then push the throttle down to the maximum position. Switch the function selector to the "Wands" or "Showers" position as appropriate. Operate the M17 according to the TO.

OPERATION DURING USUAL CONDITIONS

Use the M17 according to local procedures determined by your specific needs.

INSTRUCTOR'S NOTE: STRESS TO STUDENTS THAT THE SPRAY WANDS WILL GET EXTREMELY HOT AFTER TWO MINUTES AND THAT THEY MUST ALWAYS WEAR SAFETY GLOVES WHEN OPERATING THE SPRAY WANDS. TELL STUDENTS TO NEVER SPRAY PEOPLE WITH THE SPRAY WANDS.

OPERATION DURING UNUSUAL CONDITIONS	Operate the M17 using unusual condition procedures when the temperature falls below 32 degrees Fahrenheit or during extreme heat and high altitudes.
TEN DEGREES OR LOWER	In temperatures of ten degrees Fahrenheit and lower you must preheat the system as outline in the TO. As necessary perform the thawing and freezing weather storage procedures outline in the TO.

OPERATING IN EXTREME HEAT

When operating the M17 in extreme heat move the unit into the shade. Never place an M17 so the exhaust from one is directed toward another. Inspect rubber components once a week during extreme temperatures. During high temperature operations, vapor bubbles may form in the fuel lines, keeping fuel from flowing. If you are using gasoline and you suspect this is happening switch to an alternate type of fuel.

MAIN POINT 6. SHUT DOWN PROCEDURES

Ensure the burner fuel valve control is turned fully clockwise then set the function selector switch to "OFF."

INSTRUCTOR'S NOTE: DO NOT USE THIS TRAINING DOCUMENT TO SHUT DOWN THE M17. THE TO CONTAINS VITAL CAUTIONS AND DETAILS NOT LISTED HERE.

Before continuing: squeeze spray wand triggers, allow water pump to circulate if showers were used, or purge decontaminent if injector was used as applicable. Lastly hold throttle lever in the up position to stop engine. Remove and disassemble the hoses and connections according to the TO.

CONCLUSION

SUMMARY:	We discussed the differences between the M17 TO and other TOs and some safety information on the M17. We then covered some Pre-Operation considerations, M17 components and functional systems. We finished by talking about the operation and shut down procedures for the M17.
REMOTIVATION:	Combining proven systems like the M17 and your contamination control team procedures helps to complete the mission better and in less time.
CLOSURE:	The M17 is designed for maximum flexibility while offering extended mission capability. Use it safely.
TRANSITION:	(Develop locally to transition to the next topic)

PART III
EVALUATION
STUDENT PERFORMANCE STANDARDS

1. Inspect the M17 for serviceability.
2. Assemble and prepare the M17 for use.
3. Operate the M17 under usual or unusual conditions as described in the technical order (TO).
4. Shut down the M17.

TEST ITEM

1. LESSON OBJECTIVE: List the uses of the M17.

QUESTION: (True or False)

The spray wand attachment is used by people to shower.
a. True
b. False

Key: b

Reference: Main Point 2

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2. LESSON OBJECTIVE: List the major components of the M17.
QUESTION: (Multiple Choice)

The Major components of the M17 are:

a. Engine and Heater Fuel Cans, Pump/Heater, Tool Kit, Accessory Kit, Water Tank, Cover.

b. Engine and Heater Fuel Cans, Pump/Heater, Tool Kit, Water Tank, Heater System and Cover.

c. Engine and Heater Fuel Cans, Pump/Heater, Tool Kit, Box Kit, Water System and 1,580 gallon Water Tank.

d. Engine and Heater Fuel Cans, Pump/Heater, Tool Kit, Accessory Kit, Heat Exchanger and 30,000 gallon Water Tank.

Key: a

Reference: Main Point 3

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3. LESSON OBJECTIVE: List the types of fuel required for the heater and engine.
QUESTION: (Multiple Choice)

The types of fuel used by the heater and engine are:

a. Engine uses a gasoline/oil mixture - Heater uses regular gasoline, gasoline/oil mix, diesel, jet fuel (JP4) or kerosene.
b. Engine uses a gasoline - Heater uses gasoline/oil mix, diesel, jet fuel (JP4) or kerosene.
c. Engine uses a gasoline/oil mixture - Heater uses regular gasoline, diesel, jet fuel (JP4) or kerosene.
d. All above fuels can be used in both.

Key: c

Reference: Main Point 3

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4. LESSON OBJECTIVE: List the safety gear used when operating the M17.
QUESTION: (True or False)

You must always wear hearing protection when working within 35 yards of the M17.

a. True
b. False

Key: b

Reference: Main Point 1
